

WHAT IS CLAIMED IS:

1. A heat sink assembly used in power electronics applications for transferring heat from a heat generating source to a cooling medium, comprising:
 - a first base plate; and
 - a first plurality of thermally conductive pins located in said first base plate for transferring heat from said heat generating source to said cooling medium, said first plurality of pins extending substantially perpendicular to said first base plate, a first end of each pin of said first plurality of pins being in contact with said heat generating source.
2. The heat sink assembly according to claim 1, wherein said heat generating source is comprised of an electronic insulator assembly having a semiconductor die and an insulator that is sandwiched between a top layer and a bottom layer, said semiconductor die positioned on said first layer, said second layer being in contact with said first plurality of pins.
3. The heat sink assembly according to claim 1, wherein said heat generating source is comprised of a semiconductor die being in contact with said first plurality of pins.
4. The heat sink assembly according to claim 1, wherein said first end of each pin of said first plurality of pins is slightly above a plane of said first base plate in order to contact said heat generating source.
5. The heat sink assembly according to claim 1, wherein said first base plate comprises a non-indented portion and an indented portion for holding said first plurality of pins, said first end of

each pin of said first plurality of pins being slightly above a non-indented portion of said first base plate in order to contact said heat generating source.

6. The heat sink assembly according to claim 1, wherein said first plurality of pins is attached to said first base plate by an adhesive.

7. The heat sink assembly according to claim 1, wherein said heat generating source is attached to said first plurality of pins by a thermally conductive adhesive.

8. The heat sink assembly according to claim 1, wherein said first plurality of pins have a geometric shape selected from a square, a triangle, a circle, a diamond, a rectangle, and an ellipse.

9. The heat sink assembly according to claim 1, wherein said first plurality of pins is arranged in a predetermined layout pattern.

10. The heat sink assembly according to claim 1, further comprising a heat exchange assembly having a top mounting portion, a bottom mounting portion, and a coolant channel formed therebetween, such that said cooling medium for absorbing heat is located in said coolant channel.

11. The heat sink assembly according to claim 10, wherein a second end of each pin of said first plurality of pins is positioned in said coolant channel for transferring heat from said heat

generating source to said cooling medium.

12. The heat sink assembly according to claim 11, further comprising mounting hardware for attaching said first base plate to said top mounting portion.

13. The heat sink assembly according to claim 12, further comprising a gasket material for preventing said cooling medium to escape from said coolant channel.

14. The heat sink assembly according to claim 13, wherein a surface on said second end of each pin of said first plurality of pins, substantially perpendicular to a longitudinal direction of said first plurality of pins, slightly contacts said bottom mounting portion during the expansion of said first plurality of pins due to a heat transfer process.

15. The heat sink assembly according to claim 10, further comprising a second base plate and a second plurality of thermally conductive pins located in said second base plate for transferring heat from another heat generating source to said cooling medium, said second plurality of pins extending substantially perpendicular to said second base plate, a first end of each of said second plurality of pins being in contact with said another generating source, said second base plate located substantially parallel and opposite said first base plate, such that said first and second plurality of pins are mirror images of each other being positioned in said coolant channel.

16. The heat sink assembly according to claim 15, wherein a pin in said first plurality of pins is offset from a corresponding pin in said second plurality of pins, such that a wave type of passage

is created for said cooling medium.